DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on 31 October 2007 and 19 February 2008 have been entered.

Claim Objections

2. Claim 43 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Specifically, the text of Claim 43 has now been added to Claim 42, from which Claim 43 depends, and thus Claim 43 fails to further limit Claim 42.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 39-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuda (JP 9-17770-A) in view of U.S. Patent 6,921,724 to Kamp et al. The

following rejection refers to the Machine-Assisted Translation (MAT; obtained from The Thomson Corporation; 2005) and Figures of Fukuda.

In regards to Claims 39 and 45, Fukuda teaches a plasma processing method for conducting a plurality of different processing on a film on a front side of a specimen W placed on a mount surface of a specimen table 21 disposed inside a processing chamber (Figure 3) using plasma generated therein, comprising:

adjusting an internal temperature of the specimen table formed of a heat conduction member so that a temperature in a central portion of the specimen table becomes higher than a temperature in an outer circumferential portion of the specimen table by a predetermined value (Paragraphs 19, 29);

generating a plasma by supplying a processing gas to the interior of the processing chamber and evacuating the inside of the process chamber from the lower portion thereof, and processing the film by applying a bias electric power 19 to the specimen table (Paragraphs 27 and 29);

while, after the specimen is placed on the specimen table and absorbed electrostatically on the dielectric film (Paragraph 29), supplying a heat conducting gas with a lower pressure to a space between the mount surface positioned above the central portion of the interior of the specimen table and a rear side of the specimen, and supplying a heat conducting gas with a higher pressure to a space between the mount surface positioned above the outer circumferential portion of the interior of the specimen table and a rear side of the specimen to adjust the heat conducting gas to a

predetermined pressure difference in spaces of the central and outer circumferential portions of the rear side of the specimen (Paragraphs 19, 39);

and processing the film while adjusting said pressure difference to a value different from the predetermined pressure difference. (Paragraphs 34-38)

While Fukuda discloses the dual coolant system and its use and the dual heat conducting gas system and its use as different embodiments, **Fukuda also expressly teaches that the embodiments are used together.** (Paragraph 16; *In this case, the supply system of a refrigerant and/or a warming medium* ***may be plural****. However, it is good* ***even when*** *it is single.*) Moreover, one of ordinary skill in the art would have been further motivated to combine the teachings of Fukuda to combine the fine control over the surface temperature of the wafer provided by each embodiment (Paragraphs 32, 38) to obtain even better control over the surface temperature of the wafer, thereby obtaining a precise and repeatable etching process (Paragraph 41). In other words, one of ordinary skill in the art would expect that since each embodiment of Fukuda attempts such temperature control, using the two embodiments together would produce even better control. Lower temperature and higher heat conductance at the periphery could, for example, work together to accomplish the same goal of offsetting the excess radiant heating at the periphery. (Paragraphs 29 and 38)

Fukuda teaches that an upper surface of the specimen table can be a dielectric film (*ceramic*), as broadly recited in the claim. (Paragraph 36)

Fukuda also teaches that the temperature of the specimen table is adjusted by adjusting the temperature of coolants passing through passages 14, 11 disposed at a

central portion and an outer circumferential portion of the specimen table. (Paragraphs 26-29)

In regards to Claims 39-50, Fukuda does not expressly teach processing upper and lower films of a plurality of films on a specimen with different temperature profiles obtained with the process settings as recited in the claims, or that the temperature settings can be adjusted on the basis of information obtained before processing of the specimen.

Kamp et al. teaches processing upper and lower films of a plurality of films on a specimen with different temperature profiles across the specimen, and adjusting the temperature settings based on information obtained before processing of the specimen about the type of material of each film layer. (Figure 4C; Column 8, Lines 28-58; Column 9, Line 10 - Column 11, Line 39)

It would have been obvious to one of ordinary skill in the art to modify the method taught by Fukuda to process upper and lower films of a plurality of films on a specimen with different temperature profiles across the specimen, and to adjust the temperature settings based on information obtained before processing of the specimen about the type of material of each film layer. The motivation for doing so, as taught by Kamp et al., would have been to process multi-layered specimens with changing temperatures layer by layer so as to achieve profiles and selectivity that cannot be otherwise achieved (Column 11, Lines 28-30), without having to dedicate chambers for each temperature, increasing manufacturing flexibility and cost effectiveness (Column 11, Lines 30-39). Moreover, by changing the temperatures of the central and circumferential portions of

the specimen, the wafer center to wafer edge depth and/or profile uniformity can be improved. (Column 9, Lines 30-49)

It further would have been obvious to one of ordinary skill in the art, in practicing the method taught by the combination of Fukuda and Kamp et al., through routine experimentation, to optimize the values of the pressures of the heat conductive gases and the temperatures of the cooling mediums in the manner recited in the claims (i.e. changing the pressures while holding the temperatures of the cooling mediums constant, or if necessitated by the temperature profile desired on the specimen, changing the temperatures of the cooling mediums so as to attain a greater temperature gradient across the specimen), as result-effective variables to optimize the edge depth and/or etch profile uniformity *for the type of film layer being processed.* See Kamp et al., Column 8, Lines 28-58; Column 9, Line 10 - Column 11, Line 39.

Further in regards to Claims 39 and 45, Fukuda does not expressly teach that the heat conductive block is formed of metal.

Kamp et al. teaches that a heat conductive block 302 may suitably be formed of a metal, such as aluminum. (Column 6, Lines 3-8)

It would have been obvious to one of ordinary skill in the art to form the heat conductive block of Fukuda of aluminum, as taught by Kamp et al., as an art-recognized suitable material for forming the heat conductive block. The selection of a known material based on its suitability for its intended use is *prima facie* obviousness.

Further in regards to Claims 39 and 45, Fukuda teaches that a ring-like protrusion that divides the two areas from each other is disposed on the upper surface

of the table, the upper surface of the table contacting the rear surface of the specimen, as broadly recited in the claims. (Figure 3b; Paragraph 36)

Fukuda also teaches that a ring-like part is disposed between the central channel and the outer circumferential channel inside the heat conductive block (i.e. there is a ring-shaped portion of the heat conductive block separating the central and outer channels).

Fukuda does not expressly teach that the ring-like part has a lower heat conductivity than the rest of the heat conductive block, to suppress a heat conduction between the central portion and the outer circumferential portion thereof.

Lee et al. teaches, in a multi-zone thermal treatment block 40, providing ring-like parts 42 having a lower heat conductivity than the rest of the heat conductive block 40. (Figure 2; at least Column 7, Lines 18-63)

It would have been obvious to one of ordinary skill in the art to modify the apparatus of Fukuda to form the ring-like part inside the heat conductive block to have a lower heat conductivity than the rest of the heat conductive block, as taught by Lee et al. The motivation for making such a modification, as taught by Lee et al. (Abstract; Column 7, Lines 18-63), would have been to suppress heat conduction between different thermal zones to create defined zones for controllable zonal thermal treatment of a substrate.

Response to Arguments

5. Applicant's arguments filed 31 October 2007 and 19 February 2008 have been fully considered but they are not persuasive.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Specifically, in regards to Applicant's arguments that neither Fukuda or Kamp expressly teaches the exact temperature/pressure differentials recited in the claims, this argument is not persuasive. The rejection set forth above is based on the *obviousness,* in practicing the method taught by the combination of Fukuda and Kamp et al., *through routine experimentation*, to optimize the values of the pressures of the heat conductive gases and the temperatures of the cooling mediums in the manner recited in the claims (i.e. changing the pressures while holding the temperatures of the cooling mediums constant, or if necessitated by the temperature profile desired on the specimen, changing the temperatures of the cooling mediums so as to attain a greater temperature gradient across the specimen), as result-effective variables to optimize the edge depth and/or etch profile uniformity *for the type of film layer being processed.* See Kamp et al., Column 8, Lines 28-58; Column 9, Line 10 - Column 11, Line 39. In other words, while Fukuda or Kamp may not expressly teach the exact claimed temperature/pressure settings, Examiner argues that one of ordinary skill in the art, taking the teachings of the cited art as whole, would have found it obvious, with a reasonable expectation of success, to arrive at the claimed temperature/pressure settings.

In regards to Applicant's argument that Fukuda does not teach the claimed ring-like protrusion, Examiner continues to disagree. Examiner's position in regards to this issue is set forth in the rejection above.

In regards to Applicant's arguments regarding the added feature of the ring-like member having a lower heat conductivity than the rest of the heat conductive block, anything lacking in the teachings of Fukuda or Kamp is now remedied by the teachings of Lee et al.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571)272-1219. The examiner can normally be reached on core hours of 10-5, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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